1938 MARKING RULES, EASTSIDE PINE

J. R. Berry
San Francisco, California
July 8, 1938

S
SALES
Marking

San Francisco, California
July 8, 1938

FOREST SUPERVISORS, PLUMAS
TAHOE
SHASTA
MODOC
LASSEN

The subject matter of this circular applies only to the eastern Sierra slope ponderosa pine type and adjacent west slope area of similar characteristics on the Plumas National Forest.

It became apparent last season that it was going to be necessary for us to make a study of the possibilities of leaving more timber for a second cutting on our timber sale areas--particularly pine. Yarding logs by means of caterpillar tractors and transporting logs from landing to main line railroad, or mill, with trucks are methods now generally prevalent. We have no evidence at present that caterpillar tractor yarding cost is increased by lighter cutting, and truck hauling has greatly decreased the depreciation item formerly connected with railroad log transportation. Both these factors tend to make a lighter cut an economic possibility.

In considering this problem, it appeared self-evident that, because of widespread regional familiarity with the thrift class system of marking developed here soon after the Region was established and later refined and elaborated by the California Forest and Range Experiment Station, the main features of this system should be retained. The abandonment of this system would involve the discarding, or reworking, of a large volume of basic silvicultural research data upon which we have founded our silvicultural and regulation practices.

New Tree Class

Since the bulk of our timber marked for cutting falls within the mature (class 3) and overmature (class 5) thrift classes, it was evident that no material increase in volume left could be made without leaving additional trees of these classes. Therefore, the major proposed change in our marking system consists of leaving additional volume in class 3 and class 5 trees which appear to be good risks. The tree classification will remain the same except for the introduction of a sub-classification of class 5, to be known as class 5a, which embraces the most thrifty appearing and best risk class 5 trees. Mr. Dunning, of the California Forest and Range Experiment Station staff, has defined this sub-class as follows:

Copy for Dr. K. A. Salman

Class 5a: Age, over 300 years; position, isolated or dominant; crown, long - 65 per cent or more of stem length; top, flat; vigor, poor.

Field tests have indicated that this definition is satisfactory for administrative use except that it is considered desirable at present to leave trees otherwise acceptable for retention which do not have a crown length of quite 65 per cent, if they appear to be otherwise desirable leave trees. Trees classed as 5a should be of relatively vigorous appearance in comparison with the average run of class 5 trees.

Economic Factors

In this new type of marking it is essential that consideration should be given to the economic factor as well as the risk factor. It is necessary that the appraiser should set up economic guides in each appraisal and that these guides, when approved by the administrative authority, should be followed by the marker in sale administration. These guides should be based upon the premises of a fair stumpage price (not below the established minimum except in unusual instances) and a fair margin of profit for the operator.

For the present, the definite economic rule is established that no trees of less than 18" D.B.H. will be marked for cutting for utilization. Such trees may, of course, be marked for cutting and further treatment because of disease or actual presence of insects if desirable and allowable under the terms of the contract.

Also, the definite economic rule is established that all class 5a trees, unless needed for seed trees, will be marked for cutting which have two or more select logs. Our sample marking data indicate that such trees are rare. No class 1, 2, 3, or 6 trees otherwise desirable "leaves" will be cut for quality. It devolves upon the appraiser to fully establish in each case the need for any modification of these rules, or of further concessions because of the economic situation.

Risk Factors

To mark timber intelligently, both appraisers and timber sale administrators must know how to identify, weigh, and evaluate indications of presence of insects, disease, fire damage, and mechanical injury or abnormality. This is fundamental, and it is here assumed that no men will be assigned to timber marking who do not have the necessary background of education and training to enable them to judge the degree of these risks with reasonable accuracy. Entomological research has made distinct progress recently in the direction of more accurate determination of poor insect risk trees, although it should be understood that this problem has not yet been solved. Further experimental work is being carried on to check current ideas on this subject. The following

four tentative insect risk classes have been described by the local office of the Bureau of Entomology and Plant Quarantine.

DESCRIPTION OF SUSCEPTIBILITY CLASSIFICATION

"In the following description a certain order is followed. The degree of vigor or susceptibility represented by the class first is stated. Next is a general statement of a broad impression of the crown condition of the class. Following this are statements describing symptoms connected with that degree of susceptibility or vigor each of which may be considered independently."

CLASS 1 VIGOROUS RESISTANT

Full foliaged, healthy appearing crowns.
Foliage of healthy appearance, needles usually long or coarse, color good dark green.
Practically all twigs with normal foliage complement, no weakened portions of crown.
No evidence of active infestations.

CLASS 2 FAIR TO GOOD VIGOR SOMEWHAT RESISTANT TO SLIGHTLY SUSCEPTIBLE

Fair to moderately vigorous crowns, imperfect in spots.
Foliage mostly healthy, needle length average or better, color fair to good.
Some twigs or branches lacking foliage complement, few small weakened portions of crown.
No evidence of active infestations.

CLASS 3 FAIR TO POOR VIGOR SLIGHTLY TO MODERATELY SUSCEPTIBLE

Crowns of fair to poor vigor, somewhat ragged or thin in parts.
Foliage in parts of crown thin, bunchy or unhealthy, needles average to shorter than average, color fair to poor.
Some to many twigs lacking foliage, some branches fading or dead.
Evidences of active infestations concern only a very few scattered branches.

CLASS 4 LACKING VIGOR MODERATELY TO VERY SUSCEPTIBLE

Crowns of very poor vigor, ragged or thin, often showing evidences of active infestations.
Foliage thin or bunchy. Needles short, or sparse or color poor.
Twigs of branches dead or dying. Large portions of crown weakened.
Active, usually top-killing infestations often present.

Dr. K. A. Salman has made the following comments in regard to this classification:

"The elements used in this classification are concerned only with the apparent vigor of the crown, the foliage, the twigs of the branches. The factors of age, crown form and crown position in the forest canopy do not enter into the classification.

"In the . . . description of this classification there are certain natural defects of trees which do not enter into a consideration of susceptibility. Apparently they are not connected with the vigor or lack of vigor of individual trees. Those factors are as follows:

"Stag top:- An old bare spike, the result of an old top-killing infestation from which the tree has recovered. When other parts of the crown are vigorous or the spike is not connected with progressive infestations or other evidences of deterioration, it should be ignored.

"Mule tail foliage:- In some trees foliage has a distinctly bunchy appearance though the needles are long. This condition is due to a peculiar development of the branches and apparently is a normal character of a certain strain or type of pine tree. Other things being equal, it should be ignored.

"Off color due to cold:- In certain years and locations needles are browned due to the effects of low temperatures. This browning of itself does not indicate susceptibility. If severe or if it affects entire tops or cambium, it may have a considerable effect on susceptibility. However, light, local or generalized browning of foliage should be ignored.

"Cone fade:- Often, in seed years, needles behind the cones die and fade. Apparently this fading has no relation to susceptibility.

"Natural shading out of branches:- On most trees in a fairly closed canopy the lower branches lose their foliage and die. This must be differentiated from the dying of twigs and branches in the

upper, unshaded parts of the crown which are definite indications of susceptibility. Natural shading out of branches does not indicate a weakness.

"In stands and in individual trees there apparently are no clearly marked steps in the change, over time, from a resistant to a susceptible condition or from a vigorous to a weakened condition. Those changes are marked by the appearance of no definite single character that can be used in all trees. Usually several or different evidences of deterioration develop in different trees. Some appear to be more particularly concerned with the early stages of deterioration while others may be more closely connected with the later stages.

"There are, in individual trees and depending on effective factors, periods of retarded or increased rates of change in the progression leading to high susceptibility and death. In different areas the rate of change is different, being more rapid in the environments that are more unfavorable to tree health. Exceptionally, in some trees in which symptoms of susceptibility concern only a small portion of the crown or bole, there may be reverses in the progression and recovery is possible.

"This classification designates four different degrees of vigor or susceptibility, each of which has purely arbitrary limits. All gradations of vigor or susceptibility occur in nature. This classification merely attempts to bring together the individual trees in groups representative of approximately similar ranges or degrees of susceptibility.

"It has been found, by analysis of green trees when felled, that the degree of success or intensity of incipient flathead infestations varies with the degrees of susceptibility as outlined above. Since this classification has been applied it has been indicated that the mortality under all but the short peak period of an infestation cycle occurs predominantly in the classes designated as susceptible in the above classification. It has been shown, by analyses of infested trees since 1931 that, except for the short peak period of an infestation cycle, flathead borers predominated in initiating the attack and becoming successful in the infested trees. It is therefore tentatively concluded that, during the past seven years and with the exception of the short peak period, the degree of incipient flathead infestation and the degree of susceptibility of trees to bark-beetle attacks were very closely correlated."

This description should be used by appraisers and timber markers in classifying standing trees as to insect risk, subject to further change and refinement. Classes 1 and 2 will be known as "good insect risk trees," and classes 3 and 4 will be known as "poor insect risk

trees." As a general rule, all poor insect risk trees above the 18" economic diameter limit will be marked for utilization. All good insect risk trees in classes 4, 5, and 7 above the economic D.B.H. limit should also be marked for utilization. Except for the cutting of class 5a trees which have two or more select logs, all good insect risk trees in the other tree classes should be left unless the duly approved appraisal has clearly shown the need for further economic concessions or the marker discovers bad fire scars, defect, disease, or injury of sufficiently serious character to justify cutting.

Interpretation of these insect indications in the field by men skilled in this work is essential to their intelligent application, and it is suggested that you request cooperation from Mr. Miller and his organization. The Division of Timber Management will also be glad to assist in putting this new marking practice into effect if you will let us know of opportunities to be of help.

At the present time, the new marking practice can only be put into effect on new sales. Forest Supervisors and their timber management personnel should attempt to lay the ground work now for introducing a modified lighter cutting along the above indicated lines on going sales at reappraisal dates.

Treatment of Species other than Pine

The marking of the other species in the stand should be worked out in each case as the appraisal indicates and along the same general lines as outlined for pine, except that insect risk will generally be a minor instead of a major factor. Cutting of at least the minimum volume of inferior species necessary to remove the highest risk overmature trees will be required, as in the past, on areas where pine is being cut, except that incense cedar may be excluded from sales where it will be needed for local use within a reasonable time or probably will be saleable for special uses, such as pencil manufacture, at a higher stumpage price before serious deterioration occurs. Economic minimum marking diameters for these species will be fixed in each appraisal below which timber may be marked for felling for forest betterment but not for utilization.

Experimental markings of inferior species recently made seem to indicate that the "leave" of inferior species may be increased just about as much as the pine "leave" on a percentage basis. That is to say, assuming that we have been leaving about 20% of the pine and 30% of the white fir, if we increase our pine leave to 35% we may increase our white fir leave to 45% without any more serious degrading of the forest.

Analyses of Sample Markings

Logging Engineer Berry has made a helpful statistical analysis

of four east side marking plots which have recently been established. A copy of a portion of his memorandum for Regional Forester of June 20, 1938, is attached for study, adaptation and application to your specific timber marking problem.

S. B. SHOW,
Regional Forester.

Enclosure.

S
SALES
Marking

San Francisco, California
June 20, 1938

MEMORANDUM FOR REGIONAL FORESTER:

An analysis of the available data within the Adin Working Circle, Modoc National Forest, has been made to investigate the feasibility of setting up basic marking rules for ponderosa and Jeffrey pine that will result in a satisfactory degree of uniformity in obtaining a somewhat lighter cut than is now common practice.

The data have been collected within the past two seasons on four separate plots for which D.B.H., log height and grade, Dunning tree classification, insect susceptibility rating, standard cut or leave, and modified cut or leave were recorded for each pine tree over 12" D.B.H. The plots are described as follows:

Plot 1: A five acre plot on which most of the trees were tagged and numbered for future reference. Marked on June 3, 1938, by T. D. Woodbury, K. A. Salman, R. W. Beeson, R. W. Bacon, and J. R. Berry in SWNE Section 21, T. 40 N., R. 9 E., M.D.M.

Plot 2: A five acre plot on which the modified cut trees were tagged and numbered for future reference. Marked on August 6, 1937, by R. G. Wagner and R. W. Bacon in collaboration with officers of the Bureau of Entomology in the SWNE Section 17, T. 40 N., R. 9 E., M.D.M.

Plot 3: 49.8 acres of 1-chain strip (not tagged) marked by the same crew in locations well distributed over the Roney Flat Unit.

Plot 4: 7.7 acres of 1-chain strip in Sections 9 and 10, T. 40 N., R. 9 E., M.D.M. (not tagged) marked by Duncan Dunning, K. A. Salman, P. R. Kevin, R. W. Bacon, and J. R. Berry.

Although these marking jobs were done by different personnel on different areas, the problem was approached with the same objective in mind; that is, to attempt a lighter marking by leaving additional trees of good thrift as a larger base for increased per acre growth and second cut, but at the same time insuring a silvicultural betterment of the area through cutting.

First consideration of marking under this primary objective is the removal of all material that would definitely be lost before the second cut. Studies by Dr. K. A. Salman indicate that there is a

perceptible difference in appearance between trees of comparatively little risk of beetle loss and those almost sure to be attacked. These susceptibility classifications as tentatively set up for east side ponderosa and Jeffrey pine in Mr. Woodbury's memorandum, "S-Sales-Marking" of June 10, 1938, were used in marking these areas.

In addition to the actual marking of these areas by the consideration of individual trees, complete records were kept so that the data could be analyzed to determine the approximate results that could be obtained under any desired marking policy that might be necessary.

The following table of comparative results shows a considerable uniformity of susceptibility and marking percentages, although there was a marked difference in the distribution of Class III, IV, and V trees indicating a difference of opinion as to the dividing line between these age classes. However, as is indicated by the final marking results, this factor appears to have less effect under the modified marking than under the previous rules.

Regional Forester

6/20/38

Comparative Results of Crown Class and Susceptibility Distribution
and Actual Field Marking for Ponderosa and Jeffrey Pine on
four plots in the Adin Working Circle, Modoc National Forest.

Dunning Class	Average of all plots			Plot No. 1 5 acres			Plot No. 2 5 acres			Plot No. 3 49.8 acres			Plot No. 4 7.7 acres		
	% of stand within crown class	% of crown class poor risk	% of crown class cut	% of stand within crown class	% of crown class poor risk	% of crown class cut	% of stand within crown class	% of crown class poor risk	% of crown class cut	% of stand within crown class	% of crown class poor risk	% of crown class cut	% of stand within crown class	% of crown class poor risk	% of crown class cut
I	2.0	.0	.0	2.8	.0	.0	2.3	.0	.0	1.8	.0	.0	1.1	2.2	.0
II	1.8	5.6	.0	.0	.0	.0	4.3	3.3	3.3	2.2	5.6	5.6	.4	10.5	.0
III	16.0	15.0	17.8	30.7	7.7	15.4	8.8	11.5	11.5	7.0	12.7	12.2	17.8	30.5	30.5
IV	5.4	24.1	92.2	2.4	.0	100.0	8.2	31.6	31.6	7.3	28.4	43.1	3.6	13.3	30.0
V	54.6	62.1	100.0	47.5	76.2	100.0	53.9	64.7	100.0	64.4	67.8	99.1	52.5	39.4	
Va	19.9	2.4	2.4	16.6	23.7	38.1	22.3	.0	.0	16.8	.0	.0	24.1	.0	.0
VI	.1-	31.3	12.5	.0	.0	.0	.1	60.0	60.0	.1	14.3	14.3	.0	.0	.0
VII	.3	8.7	67.4	.0	.0	.0	.1	.0	.0	.4	17.0	55.3	.5	.0	.0
Total	100.0	38.7	63.9	100.0	42.5	60.9	100.0	38.7	57.7	100.0	46.8	68.2	100.0	26.6	59.0
Cut under standard marking	85.2					78.2			84.3			89.6			88.2
Average stand per acre	14,652 ft.B.M.			21,988 ft. B.M.			22,844 ft. B.M.			12,278 ft. B.M.			19,587 ft. B.M.		

Class Va is a subdivision of Dunning's Class V, and in marking Plot No. 1 the better-appearing Class V trees were tallied in this group. The Va classification was not used in last year's marking, and for this analysis it is considered that the Class V trees which were left under modified marking were the ones of better thrift appearance. This should be approximately correct, except for the few good thrift trees of high quality which were marked on that basis. The analysis indicates a considerable degree of conformity for the percentage of material in trees of this class.

Mr. Dunning's memorandum, "S-Sales-Marking," of June 6, 1938, gives a definition of Class Va trees which distinguishes them from other Class V trees by "exclusively dominant position and long crown (65% or more)." This spring the marking boards have tried the Keen classifications and found the Thrift Classes B and C, which are distinguishable by position and crown length, to be of little value to the marker as approximately as many Class A's were cut as were left, and some Class B's were considered to be desirable leave trees. It is my feeling that Mr. Dunning places too much emphasis on a long crown, although a desirable feature, and not sufficient emphasis on the less descriptive characteristics such as color and density of foliage.

After analyzing the data, it appears that a satisfactory degree of conformity in marking the pine of the east side types depends largely upon the conformity of judgment for the new Class Va and the susceptibility classes. The preceding table of data gives considerable hope that these classifications can be made satisfactorily.

The following tentative set-up is recommended for trial as a basic marking policy for ponderosa and Jeffrey pine on the east side sites.

Summary of Approximate Marking Results that will be obtained by application of the proposed Revision of Marking Rules to East Side Ponderosa and Jeffrey Pine as shown by "Direct Average" Percentage Distribution of total net stand on four marking plots totaling 67.5 acres in the Adin Working Circle, Modoc National Forest

Old Marking Rules	Proposed Marking Rules	Direct Average Per cent of Total Net Stand	
		Leave	Cut
Poor Risk Trees - Susceptible Classes 3 and 4			
No definite provisions for either economic diameter or susceptibility	Cut all trees above economic D.B.H. 18" D.B.H. proposed for East Side Dunning's Class I	Neg.	Neg.
	" " II	.1	Neg.
	" " III	Neg.	2.4
	" " IV	.1	1.2
	" " V having one select log		25.3
	" having no select log		8.6
	" " Va having one select log		
	having no select log		1.0
	" " VI	Neg.	Neg.
	" " VII	Neg.	
Total Poor Risk Trees - Susceptible Classes 3 and 4		.2	38.5
Good Risk Trees - Susceptible Classes 1 and 2			
	Dunning Class I		
Should always be retained when sound	Leave all trees except those over the economic D.B.H. which are apt to be lost because of bad fire scar, defect, or injury.	2.0	
	Dunning Class II		
Cut in preference to Class I when making thinning.	Same as Class I -- Do not cut for thinning.	1.7	
	Dunning Class III		
Desirable for retention as seed trees and for growth increment -- should be left when sound.	Same as Class I	13.0	.6

Summary of Approximate Marking Results (Continued)

Old Marking Rules	Proposed Marking Rules	Direct Average Per cent of Total Net Stand: Leave	Cut
Good Risk Trees - Susceptible Classes 1 and 2 (Cont.)			
	Dunning Class IV		
Should practically always be cut except when needed to fill openings.	Cut all trees over the economic D.B.H. except those needed to fill openings.		
	Trees having one select log		.4
	Trees having no select log	.2	3.5
	Dunning Class V		
Same as Class IV	Having one select log		18.4
	Same as Class IV-Having no select log		2.3
	Dunning Class Va		
Subdivision of better thrift Class V. Same as Class V	Same as Classes I and III -- Leave all trees except those over economic D.B.H. that are subject to loss because of bad fire scar, defect, or injury --		
	Having one select log	7.2	
	Having no select log	11.7	
	Dunning Class VI		
Should be retained because of low market value and promise of fair growth if released.	Leave	Neg.	
	Dunning Class VII		
Should be cut whenever possible.	Cut trees over economic D.B.H.	.1	.2
Total Good Risk Trees - Susceptible Classes 1 and 2		35.9	25.4
GRAND TOTAL		36.1	63.9
Comparative average results of actual marking on the four plots	Standard leave	14.9	
	Additional leave	23.6	
	Modified marking	38.5	61.5

Average net stand per acre on 67.5 acres is 14,652 feet B.M.

It is believed that the preceding set-up will give the best silvicultural results possible under lighter marking and at the same time offers an outline by which the appraiser can record data that can be analyzed and modified, if necessary, for individual cases.

J. R. BERRY,
Senior Logging Engineer.